GENETIC IDENTIFICATION OF TEN SPECIES OF PENAEID PRAWN POSTLARVAE

A study of the ecology, recruitment and dynamics of the early life-history stages of penaeid prawns is being undertaken in the Gulf of Carpentaria, northern Australia. It is essential in this study to identify to species level the individual penaeid postlarvae. Identification of specimens to species group is possible using morphological characters, however it has proved very difficult to identify all species in this way. Some of the complicating factors in this have been: the small size of individuals (down to 1 mm carapace length), developmental changes, benthic collection often resulting in broken or damaged bodies, and the large numbers requiring identification. Allozyme electrophoresis was thus employed as a tool which could solve these problems.

Two primary criteria were set for the choice of appropriate genetic enzyme markers. Firstly, the enzyme loci must exhibit a reliable and consistent difference between species which must have a true genetic basis. Secondly, the enzymes must be sufficiently strong, hardy and easy to detect, to allow the simple and rapid identification of large numbers of individuals. After examining the developmental expression of 39 enzyme loci, 2 loci, Gpi (Glucose-6-phosphate isomerase) and Pep (Peptidase, leucyl-glycine as substrate) were found which together could unambiguously identify ten species of prawn postlarvae within the genera *Penaeus* and *Metapenaeus*. These species were: the tiger prawns *Penaeus monodon*, *P. esculentus* and *P. semisulcatus*, the banana prawn *P. merguiensis*, the king prawns *P. latisulcatus* and *P. longistylus*, the endeavour prawns *Metapenaeus endeavouri* and *M. ensis*, the york prawn *M. eboracensis* and the greasyback prawn *M. moyebi*.

The techniques used (Lavery and Staples, 1990) were designed to maximise the efficiency of the identification procedure and are summarised as follows: 1) Frozen individual postlarvae plus 5 microlitres of buffer were placed in the wells of a perspex grinding chamber which had 24 wells in one line. 2) All 24 specimens were homogenised thoroughly at the same time using a 24-pin plate. 3) A slotted applicator was used to pick up a small quantity of liquid extract from all 24 specimens at one time and apply them to a cellulose acetate plate. 4) Electrophoresis was carried out for 90 to 150 minutes, followed by staining for a specific enzyme, either Gpi or Pep.

Using the two loci together, and referencing the observed banding patterns with known controls, all ten species could be identified (Fig. 1). Fewer than 5% of individuals could not be accurately identified because of low activity or smearing of bands. The technique has proved to be very efficient, with the whole procedure being carried out in less than three hours, thus making it possible for one technician with minimal equipment to identify 300 individual prawn postlarvae per day. Over 20,000 penaeid postlarvae have already been identified using this technique in the continuing programme of research on penaeid prawns in the Gulf of Carpentaria.

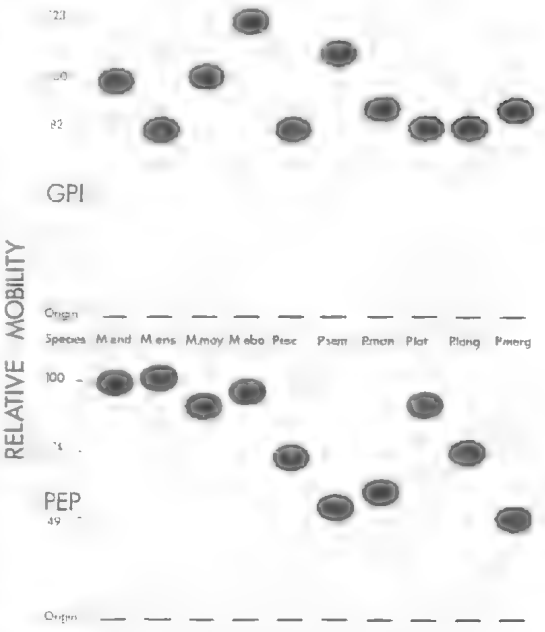

FIG. 1. Diagrammatic representation of banding patterns of ten penaeid species for the loci Gpi and Pep.

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Literature Cited

Lavery, S. and Staples, D. 1990. Use of allozyme electrophoresis for identifying two species of penaeid prawn postlarvae. Australian Journal of Marine and Freshwater Research 41: 259–266.

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